# Gas Journal

VOL. 302. 112th YEAR. LONDON, MAY 18, 1960. No. 5046. PRICE 1/6

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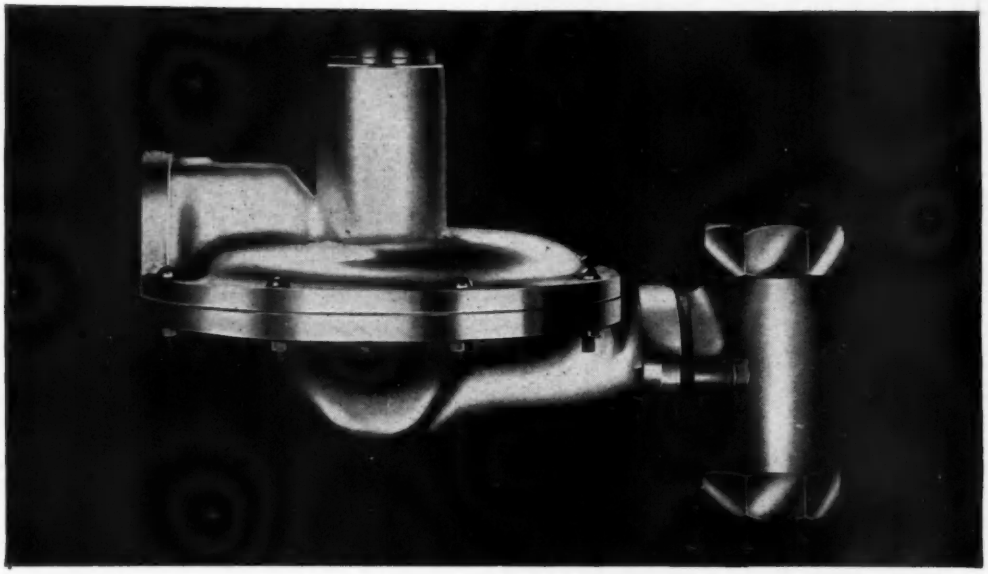

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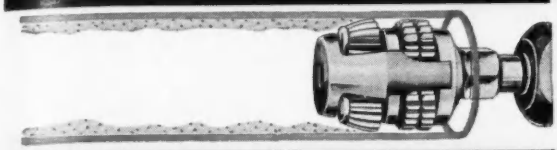

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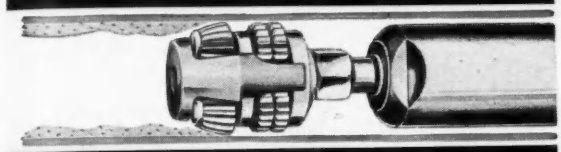

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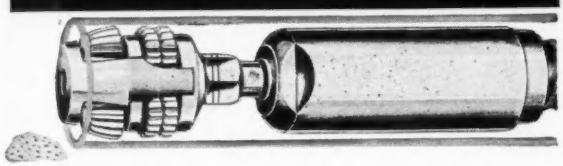

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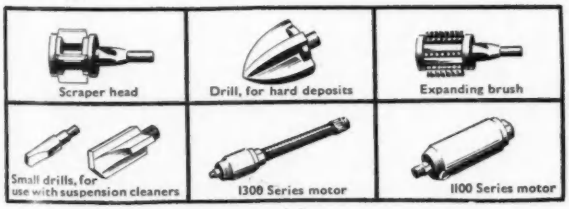


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# Gas Journal

VOLUME 302 • NUMBER 5046 • 112TH YEAR

WEDNESDAY, MAY 18, 1960

## CONTENTS

### EDITORIAL COMMENT

Sell What You Can, Gasify What You Can't - - 257
Sweet Smell of Success - - - - - - 258

### SPECIAL ARTICLES

Tradition or Progress? By Jack Castle - - - 260
Britain's First Dehydration by Refrigeration Plant - 262

### BOOK REVIEW

King's Manual, Section 7B - - - - - - 269

### NEWS SUPPLEMENT

East Midlands Appliance Sales Shatter Records - 277
I.G.U. Council Meets in Prague - - - - 277
Parsons and P.G. form Construction Enterprise - 277
Gas Teachers Plan New Association - - - 277
Labourers Can Become Skilled Under Eastern Board Scheme - - - - - - - - - 278
Company's Report Mentions Boycott - - - 278
Scottish Board May Penalise the Last-moment Payers 279
Fourteen Countries at Distillation Symposium - - 279
S.W.G.B. Runs 'New Look' Campaign - - - 279
Personal - - - - - - - - - 280
Obituary - - - - - - - - - 280
Diary - - - - - - - - - 280

### TECHNICAL RECORD

The Design and Operation of an Axial Flow Compressor Station—Pt. I. By J. D. Cormack - - 271
Gas in France - - - - - - - - 276

### TECHNICAL DEVELOPMENTS - - - 264

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*Publishers' Notice, See Page 194, May 4, 1960*

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# *the study of movement*

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TG48A

Gas Journal

COKE OVENS • BY-PRODUCTS • CHEMICALS

# *Sell what you can, gasify what you can't*

IT is at this time of the year that we may expect to receive the Chairmen's addresses both from the District Sections of the I.G.E. and from the Junior Associations. Unfortunately limitations of space make it impossible for us even to publish abstracts of all of them, so we have to content ourselves by picking out the most outstanding points from those we cannot publish and commenting on them.

Each address has its message and some may have more than one, which taken together may well point a warning of the dangers implicit in some policy being followed by the gas industry. Equally well they may stress the progress the industry has made since nationalisation, for the very reason that by becoming big business it has thrown off the yoke of parochialism.

Mr. S. K. Hawthorn, the Birmingham and District Divisional Engineer of the West Midlands Board, in his Chairman's address to the Midland Section, had something to say about several of the problems facing the industry in 1960.

First of all, however, he stresses how different the outlook for the production engineer has become in the last few years. For something like 150 years coal carbonisation was in fact the only means of producing base load gas, though in the last 70 years, the industry has been assisted by water gas in meeting peak demands. Today the situation is changing quickly; coal gasification may supersede carbonisation and oil gasification may assist—but only assist—in base load production.

For the engineer the future is exciting but in the meantime what will be the fate of the modern carbonising plants built since the war? They process the more expensive ranks of coal and produce a solid residue as a by-product. The demand for coke is being replaced by a demand for oil and it is often only the enthusiast who, after installing a suitable grate, makes it his business to completely master the burning of normal gas coke. The ordinary housewife is likely to revert to coal even though she possesses a 'coke' grate. The convenience of refined fuels for central heating make gas or fuel oil most attractive. If gas sales increase the present carbonising plants must turn out more coke. How is this difficulty to be overcome without scrapping useful manufacturing plant perhaps before newer types have been fully developed? But gas sales must be expanded. The solution to the problem is one of Mr. Hawthorn's main themes; it may be summed up in a single sentence—if you cannot sell the coke, gasify it.

At first sight this solution seems oversimplified and to the conventional gas engineer perhaps, the result of wishful thinking. Have we not been repeatedly told that water gas manufacture is expensive and that the cost of oil for carburetting is only justified by the need to meet the winter peak load?

Mr. Hawthorn brings forward some interesting figures to substantiate the validity of his proposal. He first discusses the monetary value of coke in determining the cost of gas production by carbonisation. Normally the value of the coke made is credited to the manufacturing costs of coal gas at the full market price, whether it is actually sold or not. This gives a somewhat false picture of the actual situation as it is at the present time, since most area boards are carrying heavy stocks of coke, which is not only costing an appreciable amount to stock but is losing value by deterioration. It will need to be rescreened for sale. Why stock at all? Why not sell off whatever coke there is a market for at the time of manufacture and make c.w.g. from the surplus?

Mr. Hawthorne shows that by considering this as a two-stage process of complete gasification and using p.f.d. to enrich the blue water gas, the cost of production of a basic c.w.g./coal gas mixture can be as low as 10.25d. per therm. This compares well with 12.5d. per therm for normal c.w.g., 10.0d. per therm for coal

gas and 10.6d. per therm for the present town gas mixture, all into holder. Even when using the top priced coke for peak load gas, its cost can be reduced to 11.7d. per therm.

The amount of coal carbonised will be regulated then, by the actual demand for coke at the time and by the sale of the coal gas/water gas mixture. So far so good, but the extra c.w.g. in the town gas will raise its carbon monoxide content above the present maximum of 23.2%. Since the tendency today is to reduce the toxicity of town gas, steps should be taken to lower the proportion of carbon monoxide, certainly not to raise it.

Mr. Hawthorn has his solution, which is to convert part of this carbon monoxide to the dioxide by the shift reaction. By converting half of it in the c.w.g., it is possible to manufacture a town gas rich in c.w.g. containing only 18% of CO, equal to that in a normal coal gas. The shift reaction increases the volume of gas available but reduces its calorific value by a corresponding amount, which means that the c.w.g. will need a greater degree of enrichment before mixing it with the coal gas. Mr. Hawthorn shows the cost of treating the c.w.g. under these conditions would not exceed ½d. per therm and the combustion characteristics of the final gas would not be unduly affected. Any capital cost for the necessary plant should be set against the value of the heavy stocks of coke now being carried by the Birmingham Division and the large sum of money needed to make the coke saleable.

These are the most important points of Mr. Hawthorn's address and should provide much food for thought among those engineers who are trying to find an outlet for unwanted solid fuel. At the figures quoted, it might even be possible to reduce slightly gas production costs and so obtain some slight relief from the intolerable burden of high gas prices.

Other points raised in his address were the fuller use of manpower and the possibilities of increased sales to all types of consumers.

The West Midland Board has been particularly interested in work study, and we published papers read at a Midland Section meeting on this subject a year or so ago, so we feel that this particular Board are fully conscious of its advantages in this respect.

The benefits to be gained from increased gas sales are clearly so fundamental as to be obvious, but to bring it about especially in the domestic sector appears to be largely a matter of the reduction in the price of 'ordinary' gas. It would seem that completely new thinking is necessary. The enormous field open to the industry in domestic space heating might be in the industry's grasp if it could persuade itself that the domestic consumption of ordinary gas coke is steadily on its way out to be replaced by gas, and as far as it is concerned, by gas alone. Mr. Hawthorn's ideas on solving the coke stocking problems seem to us to be an excellent interim means of bridging the gap between carbonisation and coal gasification, but still the problem of the use of expensive high rank coal remains.

# *Sweet smell of success*

THERE may be some reason for thinking that the gas and oil industries will be like the tortoise and the hare in their pursuit of the central heating market. The gas industry is traditionally something of a slow starter, probably because in its earlier days it was relatively free from competition and could expand its business in its own good time. It seems to take a good deal of goading before it gets into top gear, but once there it moves remarkably fast.

The present campaign to sell central heating illustrates this clearly. There was not a reason in the world why the gas industry could not have set the pace, by creating suitable tariffs and starting a major publicity drive. Instead it took the oil industry to show what could be done, by organising a highly efficient sales and distributing service and putting out a barrage of first-class advertising which hit the public on one of its weakest spots —the desire for higher standards of comfort which their greater spending power had led them to expect. The success of this campaign is one of the most remarkable phenomena of the post-war period, and it is all the more remarkable when one consider that the claims of oil to this market are inferior to those of gas on every count. Only in the case of the larger installations can oil lay claim to any real superiority, when its price advantage is sometimes thought to outweigh its disadvantages of bulky storage, dependence on fuel deliveries and need for greater maintenance.

With gas as an on-tap fuel, with gas boards capable of evolving tempting tariffs, with machinery for co-ordinated publicity, and with a ready made sales organisation of retail outlets and sales personnel, gas had everything on its side. It missed the rich opportunity of taking the initiative in the game, but the advantages are as real today as they would have been five years ago. Now, roused by the oil industry's success in snatching business which should rightfully belong to gas, and spurred on by falling gas sales and gas board deficits, the gas industry is fighting back—and it is making a good job of it.

When the oil industry started to push central heating it was necessary to create a network of heating engineers, builders' merchants and dealers. It was no small task but it was tackled with energy and imagination and the results are to be seen in most local newspapers and in the signs and displays in merchants' windows. Inevitably, however, the quality of sales personnel varied. Despite vigorous training schemes, the knowledge and experience of many of the representatives selling oil-fired boiler installations leave much to be desired. Equally,

the sudden demand for oil-fired boilers and for burners designed for conversions, appeared to many manufacturers as something of a gold rush. The result was a spate of equipment, good, bad and indifferent, some of which is causing a good deal of embarassment to success-crazed installers by developing a variety of complaints which necessitate the repeated attention of those who installed it and which disillusioned quite a few of those who fell for the publicity line that the fashionable and discerning householder of today cannot go wrong with oil.

Meanwhile the gas industry has been slowly but surely girding up its loins and netting some useful business 'reflected' from oil advertising which effectively sold the idea of central heating without always registering the oil part of the message. Gas boards have trained and are training large numbers of their salesmen to deal with this specialised type of business. Tariffs have been perfected, advertising has been stepped up, and easy payment schemes are imminent. The gas industry is now ready to go after this market in a really big way, together with the equally promising market for fanned warm air in which gas has a clear field.

In both these types of utilisation the South Eastern Gas Board has been well to the fore; indeed it is no exaggeration to call the Board a pioneer in the field. The North Thames was considerably slower off the mark, both in the adoption of a suitable two-part tariff and in the mounting of an advertising campaign. However, once started the Board progressed rapidly, and it is particularly cheering to note the growing degree of partnership entered into with their neighbours to the south east. That partnership, which is no doubt strengthened by the move from North Thames to South Eastern of the latter Board's present Chairman, has become evident in several projects, but last week it assumed very ambitious proportions in the joint presentation, at the Savoy Hotel, of an exhibition of gas heating services for the benefit of local authorities, architects, builders and installers.

We have no hesitation in saying that this was the most polished and effective exhibition of its kind we have seen, and we have no doubt that the many visitors were impressed by what they saw and heard. The South Eastern Board made itself responsible for the excellent displays which showed, primarily by means of blown-up photographs, examples of central heating boilers and air heaters, while the North Thames distinguished itself by producing an excellent loose leaf folder containing specially prepared information sheets designed to provide the fullest possible information for those desiring to know the systems available and the range of appropriate equipment on the market. Described in this way the handbook may not appear to be anything very remarkable, but those who have had experience of collecting material and information from manufacturers will be able to appreciate what is involved in obtaining from each maker information sheets prepared to a rigid specification, thus permitting uniformity of presentation and a good overall appearance.

One thing which is now apparent is the adequacy and variety of photographs of various types of installations in this field. A year or so ago there was a serious dearth of suitable illustrations, with the result that the same pictures appeared over and over again with considerable monotony. All that is changed now; the photographs used both in the displays and in the handbook were quite excellent and told their story far more impressively than any written description.

In the morning the exhibition was introduced to local authority visitors by Mr. R. N. Bruce, the Chairman of the South Eastern Gas Board (his opposite number in the North Thames, Mr. Michael Milne-Watson, did the honours in the afternoon presentation to builders, etc.), and his remarks had a heartening ring of confidence and optimism. He explained that since July of last year the two Boards had between them sold 5,000 central heating installations and 40,000 room heaters (they, too, had a place in the exhibition). When one considers that the two Boards have 4,500 warm air heating installations working in their areas, it is obvious that this load is beginning to assume significant proportions. Mr. Bruce listed the reasons for their success as follows: 'First, for this purpose our appliances are the cheapest to install; secondly, by use of the special two-part tariffs . . . . gas is quite competitive with other fuels; thirdly, in comparison with some other fuels gas needs no storage facilities—we in fact store it for you and as much as is humanly possible guarantee a 24-hour supply on tap; finally, and I would say this to my mind is the most important of the advantages, we and our friends the builders and installers have something which is unique, a technical service which is available to ensure that these appliances are installed properly and serviced and maintained after installation. This service is, I am quite certain, second to none throughout the fuel industries of the country.'

Mr. Bruce added that, despite the success they had achieved, they believed that they had only touched the fringe of the market, and he revealed that this exhibition was in fact only the forerunner of a much larger exhibition which the two Boards would hold at the Horticultural Hall, London.

It is abundantly clear that gas has a golden opportunity of becoming the premier fuel for home heating in this country. For the reasons we enumerated earlier, gas is in every way a superior fuel to oil for central heating. In the field of warm air heating it has virtually no rival—and this could well become the principal heating medium in lower priced and local authority housing. Lastly, in the convector gas room heater we have the logical successor to the coal fire, and here again there should be no real competition; oil can offer nothing which gives an equally trouble-free service or offers warmth with the same æsthetic appeal, while the electricity industry frankly does not want this business, being interested only in developing its heating load in off-peak periods. This raises the subject of electric floor warming, but it would be sad indeed if the gas industry allowed itself to be beaten by such an inflexible and—despite what the electrical industry may say—unproved method.

No, heating is the gas industry's legitimate business, and the business is there to be got. We like to think that the industry has now proved to its own satisfaction that the market is ripe for exploitation and that gas has an excellent chance of scooping the pool. It may only just be wafted gently on the morning air, but this, dear friends, is the sweet smell of success.

# TRADITION or *PROGRESS?*

**By JACK CASTLE**

A NATIONAL attitude of mind exists in Britain which considers that our way of doing things is the best way and that only the best is to be found within our shores. Several writers have drawn attention to the implications of this attitude: Their articles might well have been jointly published under the title 'Why are we so proud?'

Here are a few interesting points made in these articles:

A league table showing the number of university students per thousand population for each country which has universities shows us third from the bottom.

The airfield at Little Rock, Arkansas, U.S.A. (which town had hardly been heard of up to a year ago) handles more traffic than does London airport.

The last steam engine in Holland was put into a museum just about the time we began large-scale modernisation of our railway system.

The French railways hold the speed record at about 200 miles an hour.

Many other examples could be quoted in support of the contention that we are complacent instead of applying ourselves vigorously to all sorts of developments if we are to justify our claim to be one of the foremost nations of the world.

The gas industry has many faults of complacency which arise out of being too preoccupied with tradition, and not having enough regard for progress, and it is only comparatively recently that as an industry we have become aware of the fact that we are not up-to-date. It is not so much that we do not recognise that two world wars have changed the social structure and habits of the community as that we are out-of-date in our thinking within and about our own industry, which is exemplified by a rigidity of approach to the problems which beset us.

There is an urgent need for self-examination on such matters as the relative importance of the commercial and manufacturing side of our business; the techniques and equipment which we employ; the profitability of our customers' service; industrial relations; the interchangeability of staff; the role of education in its broadest sense, and so on.

### Available markets

In examining what markets we are best fitted to serve, it seems clear that our role is that of a supplier of major heat requirements in the domestic and industrial fields. Changes in the nature of the population make it inevitable that the public will increasingly demand automatic means of heating their homes, while industry will ask for further refinements in the application of heat to its processes.

Inadequately staffed though industrial sales sections may be, their approach to business results in a steady increase in demand for gas from industry as opposed to a decline in sales to the domestic market. The main characteristics of this approach are the going out to search for business on the one hand and the offering of technical advice on the other. Our approach to the domestic market should be based on somewhat similar principles. There is enormous scope for the use of refined fuels in a field hitherto supplied by solid fuel.

Gas has, indeed, certain advantages which should ensure that we obtain the lion's share of this business, but to get it we must go out and influence, at the earliest stage, those responsible for new house building towards the use of gas for space heating. This requires a sales approach quite different from that which has ruled hitherto based, as it has been, upon waiting for customers to come into our showrooms (as they are discreetly termed). The domestic sales organisation of the future will need the support of sound technical advice by those whose duty it is to keep abreast of development in the gas utilisation field.

### Wonderful opportunity

And since for every gas showroom there are at least ten similar outlets for the sale of electrical appliances, our sales efforts in other directions need to be correspondingly greater, and this applies especially to advertising. In this

connection the frequency with which we contact every one of our customers presents a wonderful opportunity for direct advertising at the cost of printing leaflets only. In such advertising, special reference should be made to our after-sales service. What other organisation operates so all-embracing a service as we do? Aside from the police, fire brigade and ambulance services, who else will turn out at any time, in any weather? Do we make enough of the fact that gas is available all the time and not on the basis of a delivery service, however good that service may be?

The result of this approach should be a fresh pattern of demand for gas, the changing characteristics of which, being amenable to regular forecasting, would enable those departments which have to provide and deliver the gas to take proper steps to that end.

This is going to necessitate a considerable change in the attitude of production and distribution people whose laudable desire it is to operate such plant as they have at maximum efficiency, and they will have the stimulating task of evolving plant and techniques with which to meet unusual load characteristics. The plants which today form the bulk of the gas producing equipment of the industry were devised to meet the load that developed 30 or 40 years ago. Now we must devise new plants and techniques to meet the load which can be developed today by a virile commercial organisation, and not unduly influence them to find loads to suit existing types of manufacturing plant.

### Saleable commodities

Hitherto we have tended to consider our statutory obligations to supply gas as a technical exercise, without paying too much regard to the fact that we are producing saleable commodities, one of which has to conform to a simple specification. Any attempt to set up a production and distribution system and then devise the load to suit its characteristics should be doomed to failure.

In future, instrumentation and automatic control ought to be on a scale far from common in our industry, whilst the products of the new plants should take the form of non-poisonous, high calorific value gas with liquid by-products. Inevitably, oil and its derivatives will play a large part in providing the raw materials of the future, if only because the rate at which oil is becoming available is expanding so rapidly that if some of it is not processed by the gas industry to meet the domestic and industrial loads our business will be taken from us by direct application of oil, as is tending to happen at the present time. Vast as are the deposits of oil, some day there will be an end to them and then it will probably be necessary to fall back upon coal, which compared to oil is available in almost limitless quantities. The chemistry of coal, however, is so complex that the years during which oil displaces coal should be used to do the research work necessary to allow coal derivatives to take over when oil is no more.

As for distribution practice, we are likely to see much higher pressures than hitherto with the probability that at times of peak demand the calorific value of gas could be further raised to enable the distribution network to meet the demand for therms placed upon it. This could possibly be achieved by evaporating liquefied petroleum gases directly into the distribution system from strategically-placed storage vessels.

All this will require first class technical control—an aspect of management to which increasing attention is being paid. There has been a tendency of late for technical management to spend too much of its time poring over statistics when a walk round the plant would be so much more profitable. This is not to say that there is no place for statistics, but they are quite secondary to, and can never replace, control based upon what one sees on the job. It is the function of technical management to be out and about on the plant most of the time, leaving to others responsibility for collecting information which reveals trends in the business and the keeping of technical management informed of such trends by presenting them in a manner which clearly shows what is happening, with the least expenditure of time and mental effort.

The industry is fortunate in that it provides many opportunities for men to start from quite lowly beginnings and rise to positions of responsibility and reward. It should be the aim of management to afford the fullest opportunities for development to all those who enter our employ. Training and education should be developed not only to teach people how to do the job, but to encourage a method of approach to his work by the average employee which makes him as interested in change as those who devise it.

These principles apply as much to qualified staff as to manual workers. The assumption that the trained chemist, engineer or accountant should stick to his own province must give way to a more versatile attitude. There are few people who cannot give a good account of themselves in a variety of tasks. In the future it is visualised that men

**Continued on p. 263**

**Mr. Jack Castle, the author of this article, is General Manager of the Mersey Group of the North Western Gas Board. The article is a revised and extended version of one he wrote recently for the Board's journal *Link-Up*.**

## GAS DRYING BEFORE DISTRIBUTION

# Britain's first dehydration by refrigeration plant

THE recently completed gas drying plant at the Lostock Hall gasworks of the North Western Gas Board near Preston, is the first plant of its kind employing refrigeration, to be installed in the United Kingdom by the Chemical Engineering Division of W. C. Holmes & Co. Ltd. of Huddersfield.

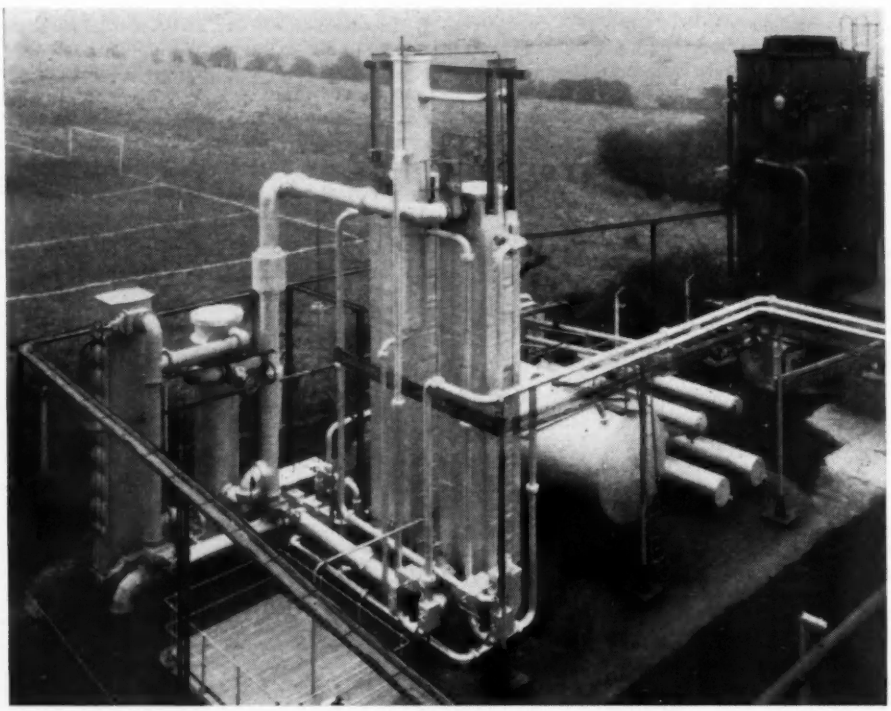
Gas drying before distribution is not new but until now the numerous dehydration plants installed by this firm have depended on calcium chloride as the drying agent.

### SECONDARY PROCESS

Though the plant was primarily installed to dry the high pressure gas supplies from Preston to Blackpool, it has also been designed to dry local low pressure gas supplies as a secondary process, since boosting would not be continuous. Any surplus of the refrigerated brine not required for cooling the high pressure gas stream is used to cool the local town gas supply, so that the maximum use is made of the refrigerating plant capacity, while local town gas supply is also dehydrated to a useful extent.

Designed to handle 5 mill. cu.ft. of gas a day at pressures of 10 to 16 p.s.i.g., the plant will chill the boosted gas to a dew point of 37°F. at all times of the year, and dependent on the load and ambient temperatures, it can also reduce the dew point of the local low pressure gas stream by an average of 6°F.

The high pressure gas, at approximately 8 to 10 p.s.i.g., passes through the after-cooler A where the heat of compression is removed, and then to the heat exchanger B, where it is cooled by the chilled gas before it enters the main cooler C. This is of cross tube design and is fed with chilled brine by way of a constant head pot D from a



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*A view of the gas dehydration plant at Lostock Hall gasworks. It has a capacity of 5 mill. cu.ft. per day of gas, cooled to a dew point of 37°F.*

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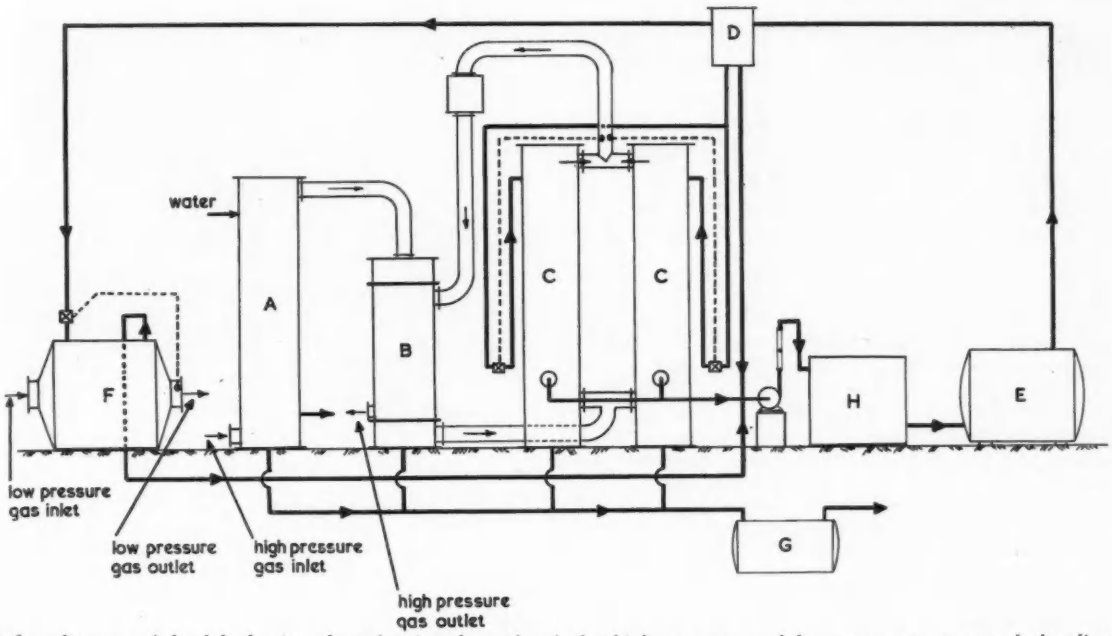



*A flow diagram of the dehydration plant showing the paths of the high pressure and low pressure gases and the direction of flow of the refrigerated brine.*

6,000-gal. chilled brine storage tank E. After passing through a mist catcher, the chilled gas finally cools the incoming gas in the heat exchanger B.

Any surplus brine pumped up to the constant head pot and not required for high pressure gas cooling, is diverted to the low pressure gas cooler F, which is also of cross tube design. Both coolers are fitted with condensate drains and the condensates from the high pressure cooler, the after-cooler and the heat exchanger are collected in a condensate tank G, from which they are discharged regularly by utilising the gas pressure.

The circulating brine is cooled in a standard compressed ammonia type refrigerating plant H, which, together with the high pressure coolers, the brine circulating pumps and the instrument air compressors are supplied in duplicate. This is to avoid any interruption in the process should mechanical troubles develop or when the plant is being serviced.

The dew points of the cooled gases are controlled by air-operated brine control valves, working in conjunction with the cool gas temperature recorders and controllers. Cooling of the circulating brine is controlled by a thermostat located in the 6,000-gal. brine storage tank, which is kept full, and provides at least two hours' reserve of chilled brine when the refrigeration plant cuts out, thereby avoiding rapid on/off cycles. The temperature of the cooled brine is generally between 30 and 35°F. at which there is no tendency for ice to form in the gas coolers. Under actual working conditions the plant has in fact operated for several hours at a brine temperature of 25°F. without any increase in cooler back pressure which would suggest that even at this temperature, no ice is formed.

# *Tradition or progress—from page 261*

will apply their abilities in different ways as occasion demands. This could well mean, for instance, the seconding of suitably-qualified technical staff from the production department to the industrial sales staff, and so on.

There is now a glowing opportunity for industry to equip itself with first-class men from the enormous number of young people who are leaving school at the present time, and it would be a national tragedy if they were not afforded the opportunity to make the most of the talents they have.

Every opportunity should be taken to see that people at all levels are as completely informed as possible on the thoughts and intentions of the management and the prospects for the industry which it sees. This means the taking of people into one's confidence to a far greater degree than has been the case hitherto, but this is not unreasonable when one considers that each generation is better educated than its predecessor.

Management has the opportunity to see much further around and into the future than is given to the man working on the shop floor. At the present time it tends to give the impression of being preoccupied with details. It is as if it had started off long ago reading the headlines of a newspaper and has now reached the stage where it is reading the very small print without realising that a new and later edition is available. The time has come to look at the new headlines.

### No reason to fear

These are not the days to be preoccupied with detail; the big scene is changing and it is the responsibility of management to see the changes and to discuss with all those who depend upon its leadership what it sees and what it proposes to do about it. If its leadership has been good in the past, there is no reason to fear that men will not accept the changes seen to be necessary in the future.

## Technical developments

# Control valves

ELLIOTT-AUTOMATION GROUP has widened the scope of its interest in control valves by the purchase of Black Automatic Controls Ltd., manufacturers of a wide range of control valve and pressure regulating equipment.

Elliott-Automation, through its Valve Group of companies at Rochester, is already one of the most important manufacturers of control valves in Europe. E.-A., which owns 25 companies all operating in the field of automation, has now, including Black Automatic Controls, four companies producing control valves of various kinds. The largest of them is the Fisher Governor Company, with a turnover running into seven figures. It has recently commenced its own operations in Australia. The other valve companies in the group are Farris Engineering Ltd., which specialises in safety relief and flexible valves for use with corrosive and abrasive materials, and James Gordon Valves Ltd., which designs and manufactures valves of all types for specialised applications. It was recently announced that James Gordon Valves has secured the contract for Pilgrim ballast valves for the new P. & O. Liner 'Canberra.'

With the acquisition of Black Automatic Controls, the group's valve interests in the gas and chemical industries are again being expanded.—*Elliott-Automation Ltd.*

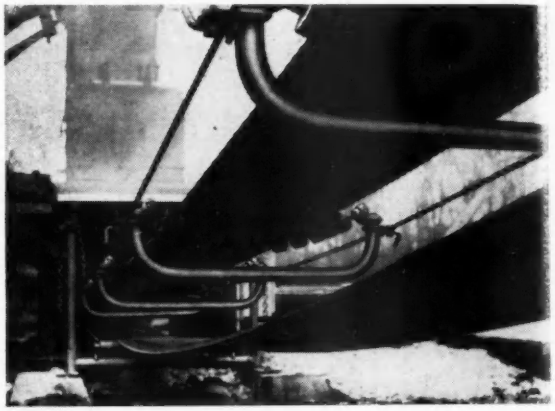
# Gas analysis

J. H. NAYLOR LTD. of Wigan have been appointed as sole agents for the United Kingdom for Wösthoff measuring instruments for analysing gases. These instruments work according to chemical-physical measuring principle, by which the gas to be tested is brought into contact with a specific absorption liquid (reagent). The resulting change in the conductivity of this liquid is a direct measure of the gas components to be measured. Some interesting fields of application of these analysing instruments are the determination of carbon and sulphur in steel and in organic substances, and the determination of oxygen in solid and liquid substances.—*J. H. Naylor Ltd.*

# Rope belt conveyor

A NEW rope conveyor system announced by Joy-Sullivan Ltd. employs as a primary component the Limberoller idler—already widely used in British industry. The new Limberope system enables the features of Limberoller operation to be extended to a much wider range of applications. The installation comprises flexible Limberollers mounted in rigid, tubular steel cradles, which in turn are suspended at each end between parallel wire ropes. These 'stringers' are held at the required height by chains attached to stands, which carry integral return idlers.

A feature of specific interest for the temporary conveyor operator is the speed with which an entire system can be set up, dismantled and relocated to meet various point-to-point conveyor requirements. This is facilitated by quick-release handle-bolts on cradle bracket and support stands, and further enhanced by the low tension required on the wire stringers between anchor points. The manufacturers state that a complete system can be installed at a price which compares very favourably with conventional rigid conveyors. The intrinsic design of the system permits insertion of Limberollers and support stands at wide intervals—Limberollers from four to nine feet, stands from 12 to 40 feet—depending on the load carried—and caters for densities up to the 150 cu.ft/lb. class. Thus on a long run substantial economies may be effected on capital expenditure. The Limberope system can be applied to any belt width from 16 in. to 36 in., wire rope diameter varying from ½ in. to ¾ in. to cope with the extremes.



*The Joy Limberope conveyor.*

It is claimed that the Limberope conveyor is particularly suited to outdoor applications, where the conveyor follows ground contours and spans gullies etc., without the need for elaborate support structures. On underground mining installations, the conveyor is very quickly extendable to keep pace with rapidly advancing faces, at a rate of approximately 20 ft. per man hour.

Improved load handling characteristics inherent in the Limberoller idler conveyor are stated to remain unimpaired in the Limberope system. The flexible idler in its swivel mounting conforms to the load, and provides a 'cushioned' ride which absorbs shock and surge loadings. Belt life is extended because there can be no 'pinching' and there are no projections to rip the belt. The troughing catenary exerts a self-centring action on the material, largely preventing spillage and underbelt material build-up. The manufacturers draw particular attention to the 'no-maintenance' feature. Two bearings only carry the idler, instead of the usual six, and are of the self-lubricating 'sealed-for-life' type, situated well above the dirt zone.—*Joy-Sullivan Ltd.*

# Industrial accidents

NATION-WIDE planned maintenance surveys, designed to prevent industrial accidents through using worn or obsolete welding and cutting equipment, are carried out by British Industrial Gases, Ltd. For many years this service, free of charge, has been conducted by highly trained technicians covering all regions of the United Kingdom. All oxy-fuel gas equipment in use in many major industrial undertakings, as well as in small factories and workshops, is examined. Reports are made on the condition of the equipment and its operational efficiency.

Survey investigations are expanding with increasing management awareness of the value of safety practice in reducing the accident rate in industry. Technicians also advise on how to obtain greater operating efficiency from the equipment, with a minimum of wastage and a reduction in manufacturing costs. B.I.G. representatives work in close co-operation with industrial safety groups in their areas.—*British Industrial Gases, Ltd.*

## Opio glandless pumps

AN agreement was signed recently between B.S.A. and Harford Pumps Ltd. of London, for the manufacture in England of the Opio glandless circulating pump which Harford have been importing from Sweden and marketing in Britain and other countries throughout the world. With the world market in mind, B.S.A. are setting up a modern mass production unit for the manufacture of the Opio pump. The plant will incorporate special purpose and fully automatic machine tools of their own design and manufacture. It is anticipated that by the end of this year B.S.A. will be capable of producing more glandless circulating pumps than any other single factory in Europe.

The Opio pump is already incorporated in many central heating systems in Sweden and in Britain and is rapidly gaining a foothold in the continental markets. B.S.A. have taken an equity in Harford Pumps Ltd. and Mr. G. C. Legg of B.S.A. is joining their Board of Directors.—*B.S.A. Tools Ltd.*

## Pneuvalves

APPARATUS for use in their pneumatic control systems has recently been placed on the market by Westinghouse Brake and Signal Co. Ltd. Known as Pneuvalves, the range consists of pneumatically-operated remotely controlled globe or marine type valves ranging from 1½ in. to 6 in. in size. Alternatively, the pneumatic operator can be supplied separately for modification of existing hand-operated valves.

Pneuvalves are available in two categories: Open/shut, which operates on an 'over-centre' principle, and thus the air supply may be released after the valve has functioned, and the variable opening type, which enables any degree of valve opening to be achieved remotely at the touch of a finger. These valves are designed for low pressure (100 p.s.i.) and are suitable for gas, air, sea water, lubricating oil, fresh and bilge water, fuel oil and distillates.—*Westinghouse Brake & Signal Co. Ltd.*

## Filters

AN interesting piece of equipment new to this country is the Tornado-Fischer automatic self-cleaning filter. Its efficiency in handling dust particles of virtually all sizes rests on the special design of the filter elements, the type of filter fabric and the patented cleaning mechanism. Negligible maintenance is required, it being necesary to lubricate only the motor and damper bearings occasionally, other moving parts being contained in dust-tight enclosures which enable them to function continuously without attention.

Types of dusts handled by the Tornado-Fischer filter, in which the temperature of the air or other gas passing through, can be as high as 350°C, include blast furnace slag, carborundum, cement, chemical products, coal dust, fertiliser dust, fluorspar, lime products, ore dressing, slag-sand, and stone dust.

Another unit in the fast-expanding Keith Blackman range of dust and fume collecting plant is the Tornado-Solivore wet scubber, Vicard process (patented) for collecting fine dusts and fumes down to .1 micron diameter or even smaller.—*Keith Blackman Ltd.*


# GAS JOURNAL

## *Readers' Enquiry Service*

***Details and coupons are given on the backing page***

# Trade publications

A new organisation, specialising in industrial and marine pipework, has just produced a handsome brochure entitled 'All About Charlton, Weddle'. Although a young company by any standard, Charlton, Weddle have installed a variety of pipework fabrications in a number of industries throughout Britain. In addition the company is fully geared to produce work in quantity for general factory plumbing—heating, steam, air and water services, etc., and this brochure describes in detail the many services they can offer.—*Charlton, Weddle & Co. Ltd.*

* * *

A well-produced handbook dealing with large-scale kitchen planning has been received from Stotts of Oldham. This describes and illustrates the progressive stages in planning an efficient large-scale kitchen for industrial catering, and gives an impressive list of recent installations undertaken both at home and overseas.—*James Stott & Co. (Engineers) Ltd.*

* * *

An interesting and well-produced booklet entitled 'Fire Protection of Structures' gives a brief interpretation of the bye-laws in relation to asbestos and asbestos-cement materials.—*Turners Asbestos Cement Co. Ltd.*

* * *

'A Service to Industry' is the title given to a handsome brochure published by Ashmore, Benson, Pease & Co. Ltd., which contains a brief description of what has been done in the past ten years to rebuild the works and to strengthen their engineering team.—*Ashmore, Benson, Pease & Co. Ltd.*

* * *

P. G. Engineering Ltd., a member of the Power-Gas Group, has recently published a booklet called 'Project and Equipment Engineering from Design to Operation'. It describes the work carried out by the various divisions covering chemical plant, petroleum plant, gas plant and general engineering contracts.—*P. G. Engineering Ltd.*

* * *

The first of a new series of technical publications has recently been produced by Camrex Paints Ltd. It deals with the industrial applications of Camrex non-oxidising preservative for protecting metals from corrosion. This preservative has been used to give long-term protection under an extremely wide range of conditions in all major industries throughout the United Kingdom, and this well-illustrated publication gives a brief cross-section of suitable applications.—*Camrex Paints Ltd.*

* * *

Publication No. 78, produced by W. C. Holmes & Co. Ltd., is entitled 'Holmes-Connersville Cycloidal Vacuum Pumps' and describes the principle of operation and design features of these pumps.

Another publication received from this firm is No. 82, which deals with the Holmes-Retroflux bag filter. These filters have numerous advantages for those applications where high dust burdens are encountered and/or dusts of an adhesive nature have to be collected.—*W. C. Holmes & Co. Ltd.*

* * *

A pamphlet describing the Paraflow plate heat exchanger has recently been produced by A.P.V. This product is a most flexible and efficient heat exchanger for heat recovery and the cooling or heating of processed liquids. Many of its applications are illustrated in this publication, including the type HF for cooling de-benzolised gas oil which has been installed at the North Thames Gas Board, Fulham.—*The A.P.V. Company Ltd.*


# Readers' Enquiry Service

**If you would like more information on products and services mentioned in the advertisement or editorial pages of the 'Gas Journal', fill in the coupons below, *one for each enquiry*, and send in unsealed envelope to 'Readers Enquiry Service', Gas Journal, 11 Bolt Court, Fleet Street, London, E.C.4.**

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## King's Manual, Section 7B

# NEW VOLUME ON REMOVAL AND RECOVERY OF AMMONIA, BENZOLE AND WATER VAPOUR

THE publication of a text book on any aspect of gas engineering cannot help being something of an event, especially when the author is the acknowledged expert on the particular subject covered. This is all the more so when it is realised how few modern books there are covering the very wide range of knowledge with which the gas engineer must be familiar, and at the same time how great are the efforts being made by gas boards to train the young men coming into industry from school and university.

The latest section of 'King's Manual of Gas Manufacture'—Section 7B, by J. J. Priestley—covers the somewhat restricted but nonetheless important subject of liquid purification. It includes ammonia and benzole washing, as well as gas dehydration, the prevention of gum formation and the stress corrosion of welded gas plant; in other words the area of the works between the gas cooling and tar fog removal plant on the one hand and the hydrogen sulphide extraction plant on the other.

Mr. Priestley is careful to deal with the basic principles underlying the processes he describes and makes it quite clear that the type of plant used for ammonia or benzole extraction is designed according to accepted mathematical formulæ, all of which he derives for the reader in the clearest and simplest way.

### Theme progressively developed

The first six chapters of the book may be seen to grow logically out of each other and progressively develop the theme the author wishes to put over to the reader.

In the first chapter the principles of counter-current washing are discussed and the necessary mathematical formulæ arrived at. This is developed in chapter two to show the principles of multistage washing. In the third chapter the mechanical features of tower and multistage washer design are explained. The next chapter describes the removal and recovery of ammonia. This is followed by two chapters on oil washing, the first dealing with the subject in general terms and the second describing the oil washing process. Mr. Priestley has included a chapter on benzole extraction by activated carbon, so bringing the subject completely up to date. In this chapter too, he describes the production of crude benzole from the two absorption media.

The student will now be familiar not only with the type of plant in use—he can see it working at the gasworks—but is in a position to understand thoroughly how it works and be able to alter the conditions of gas washing intelligently. He will also be in a position to judge the suitability of one type of washer against another for a particular works, with the conditions of which he is familiar. The carbonising engineer need no longer accept the opinions of the plant builders or the consultant chemical engineer uncritically, but with the knowledge and experience available to him can put forward constructive ideas to suit his local gas-making plant.

### Importance of dehydration

With the extensions of grid systems in all the board areas since nationalisation, has come the increasing importance of gas dehydration. The need to guarantee that, however low the atmospheric temperature may drop, the gas carried in mild steel mains under pressure will still be above its dewpoint and so avoid trouble from condensation blockages or corrosion, has stressed the necessity of reducing the water vapour content of gas at ordinary temperatures.

The chapter on this subject is therefore of some importance; it not only describes the type of plant needed to carry out this process but also the most effective position for the dehydrator in relation to other plant. The deposition of water vapour in other plant units, the naphthalene washer for instance, should be avoided and a proper control of dewpoint will reduce corrosion in gas governors and meters.

Ammonia is a by-product of gas manufacture which is becoming increasingly difficult to dispose of. No longer is ammonium sulphate made at the ordinary gasworks, instead the liquor is concentrated for easier handling and sales as a raw material. The types of plant for doing this Mr. Priestley describes, together with the underlying principles of the processes used.

The chapter on gum formation and its prevention is most timely since little seems to have been written on this subject in the past, other than descriptions of actual cases. This must be the first time that the available information has been included in a text book on gas manufacture and the volume should prove of the greatest use to students. All together this latest section of King's Manual maintains the high standards of its predecessors and carries on the tradition of the first edition of some 80 years ago, by being right up to date in the information it contains, in its format and in its presentation of the subject matter.

*'King's Manual of Gas Manufacture—Section 7B, Ammonia, Benzole and Water Vapour; Removal and Recovery' by J. J. Priestley, M.Sc., M.I.Chem.E., M.Inst. GasE. Published by Walter King Ltd., 11 Bolt Court, Fleet Street, E.C.4., at 29s. 6d. post free.*

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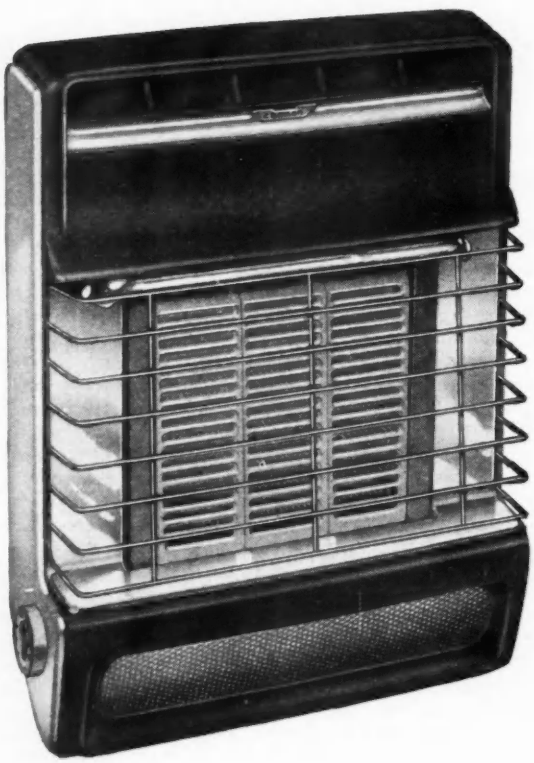

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*From a paper to the Midland Junior Gas Association.*

# The design and operation of an axial flow compressor station—*Part I*

By J. D. CORMACK, Assoc.M.Inst.Gas E.,

DEPUTY DIVISIONAL DISTRIBUTING ENGINEER,
BIRMINGHAM DIVISION, WEST MIDLANDS GAS BOARD.

THE axial flow compressor at Washwood Heath compressing station is the first of its kind to be used in this country for town gas; indeed it is believed that there is only one other gas compressing station in the world today using this design of machine.

A brief description of the Birmingham high-pressure system, together with the circumstances which led to the development of the Washwood Heath station may assist in placing the significance of the station in perspective.

Within the Birmingham district approximately 10% of the gas distributed per day is handled by the high pressure system, which, until the introduction of Washwood Heath, was supplied solely from Windsor Street gasworks: On an hourly basis this figure approaches 15% of the total.

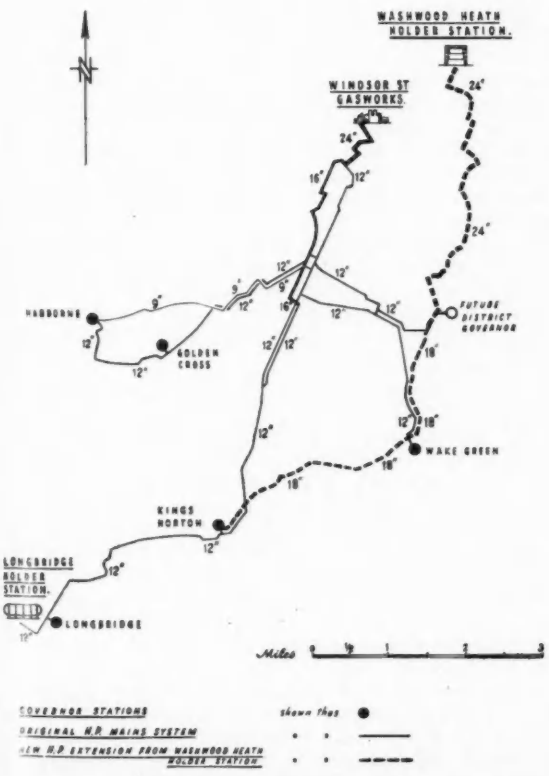



*Fig. 1. The Birmingham high pressure system.*

Broadly speaking, the high pressure system caters for consumer demands in the southern and south western sections of the district of supply. These areas are largely residential but contain several highly industrialised sections, the most notable of which is at Longbridge, where an extremely heavy and concentrated load is located at the extremity of the system.

The expanding gas demands immediately following the last war necessitated an early reinforcement of supply, since it was proving difficult to meet district commitments.

Protracted and somewhat uncertain delivery arrangements of materials during that period prevented a suitable mainlaying scheme being completed in time, and as an alternative project, a high pressure storage station at Longbridge had to be considered. By 1948 this had been established, having a releasable capacity of .5 mill. cu.ft.—subsequently increased to 1 mill. cu.ft.

In 1952 it was becoming evident that if anticipated increases in gas demand were fulfilled, further reinforcement of supply would be necessary by 1956, since the existing system—including high pressure storage—would then be fully loaded in terms of capacity and operating pressure. It was then agreed that a scheme involving both new mains and compressing plant should be planned for completion in 1956/57.

## Siting of plant

Considerable thought was given to the siting of the new compressing plant. To combine the full advantages of a saving in the overall cost with those to be gained by supplying the high pressure system from two independent sources, a new gas compressing station would be developed at Washwood Heath, and from there new mains would be laid which would merge with the existing network some two thirds of the way along the system. Fig. 1 shows the original system, together with the new mains.

From the anticipated housing development and industrial expansion it was estimated that by 1967, the high pressure system would be required to handle a maximum of 2.25 mill. cu.ft. per hour.

Owing to the characteristics of the mains network and the delivery pressure available, a maximum of 1.05 mill. cu.ft. per hour only could be handled by Windsor Street and it was, therefore, necessary to think in terms of new plant capable of dealing with outputs of up to 1.2 mill. cu.ft. per hour, at a maximum delivery pressure of 25 p.s.i.

The total plant availability at Windsor Street was 2 mill. cu.ft. per hour, 750,000 cu.ft. of which was supplied by three steam driven reciprocating compressors, and the remainder by two centrifugal machines—one steam turbine driven and the other electrically driven. The whole plant was capable of delivering gas at 17.5 p.s.i. The reciprocating compressors could effectively handle a wide range of operating requirements, so that plant for the new station should be chosen which could work at or near peak output with the maximum possible efficiency.

A number of designs of compressor were considered including an axial flow machine manufactured by W. H. Allen, Sons & Co. Ltd., which had been brought to the department's notice by Mr. G. M. Rimmer, the Board's mechanical and electrical engineer. Such a machine was unique to the gas industry and had not previously been used for town gas compression.

## Axial flow compressor purchased

Taking into account the initial costs, the estimated running costs, the overall size and the delivery promises, the axial flow compressor seemed to have much to commend it so it was eventually decided to purchase one of these units. If it proved satisfactory, it would be duplicated to provide a standby. At the same time, it was intended that the new station should function automatically as far as possible, thus reducing attendance to the minimum.

The scheme as a whole was begun in 1954 and completed with the commissioning of Washwood Heath in 1957.

The axial flow compressor is of the non-positive type, running at a high speed. It is capable of operating at pressures from 7½ p.s.i. to 25 p.s.i. and delivering 600,000 cu.ft. per hour at maximum pressure. The blading is so designed as to send the gas along an axial path from the inlet to outlet.

The high running speed of up to 19,000 r.p.m. and the high gas velocities, make possible a compact design and a machine of remarkably small overall dimensions for the duty it performs.

The compressor comprises a rotor and a stator designed to form 14 consecutive compression stages. Gas is drawn into the entry annulus through a preliminary row of static blades called the prewhirler, and then passes through the various stages of compression. The velocity of gas entering stage 1 is approximately 450 ft. per second and this speed is maintained axially throughout the whole length of the bladed section. Each stage has a row of moving and a row of fixed blades; the peripheral velocity of the gas leaving the moving blades is destroyed by the fixed row, and the loss of kinetic energy is replaced by a rise in pressure energy. The total work done from inlet to outlet is equally divided between each of the 14 stages.

The final row of static blades serves to straighten the gas flow before it passes through the outlet diffuser, in which its velocity is reduced and a further pressure rise takes place.

Blade clearance is of great importance, for it is on the maintenance of these clearances that the mechanical safety and operating efficiency of the compressor largely depend. With this machine, the minimum axial clearance between static and moving rows is of the order of .035 in., and the blade tip clearance .015 in. Special attention is, therefore, given to internal cleanliness of the machine.

Lubricating oil is supplied by duplicate pumps serving the main lubricating system and hydraulic control gear. Before the machine is started, oil is delivered to the bearings from the standby pump, the motor of which is connected to a separate electrical circuit. The primary pump is started simultaneously with the main motor, after which the standby is tripped out manually and set to come into action automatically should the oil pressure fall below a predetermined level.

The oil discharged from the pumps at a pressure of 70 p.s.i. is fed to the hydraulic speed control equipment and bypass valve operation gear. From the pump delivery line oil for lubrication passes through a reducing valve and an oil cooler to the compressor, gear box and main motor bearings at 30 p.s.i., while return oil gravitates back to the baseplate of the machine, which acts as a main reservoir. At the delivery end of the machine oil is supplied to the main journal through radial ports from the centre of the shaft, and returns to the main sump through pipework taken from the top of the bearing housing. This ensures that at this particular end of the rotor, bearing surfaces—including the thrust collar—are fully immersed before the machine is started up.

This compressor was developed from an air compressing unit and so any leakage from the rotor under normal operating conditions at either the delivery or inlet end presented no serious problem. But in adapting the machine for compressing gas, such leakage must be completely eliminated. Specially designed seals have been incorporated at each end of the rotor, which take the form of a series of close fitting baffle plates. Gas leaking past the initial baffles at the delivery end is channelled back to the inlet through ports provided in the rotor.

It is also necessary to isolate the lubricating oil system from the bladed section, since any oil contamination will encourage the accumulation of deposit on the blades. Oil leakage into the compressor is prevented by Western Impax seals fitted to each main bearing, and these, particularly the one at the inlet end, prevent oil entering the compressing section of the machine.

In addition, a small electrically driven exhauster situated in the basement adjacent to the appropriate compressor, draws away any gas and oil leaking from the seals. This 'gland exhauster' creates a negative pressure of 3 in. mercury at the drain-off points on each bearing.

From the exhauster the oil/gas mixture is pumped back to the inlet gas main through an oil separator, which prevents, as far as possible, oil contamination of the inlet gas stream. The amount of oil extracted is about ½ to ¼ pint per hour run. Oil collected from the separator has not so far been re-used for lubricating purposes because of its contamination by the gas; if, however, the purification of this oil proves to be economic, it may be used again.

The compressor is driven by a 1,150-h.p. constant speed 3,000-V squirrel cage induction electric motor through a hydraulic coupling and an epicyclic gear box. With a motor speed of 3,000 r.p.m. and a gear box ratio 6.5:1, the required maximum compressor speed of 19,000 r.p.m. is attained.

## Bypass valve incorporated

As with all non-positive types of compressor, the axial flow machine is subject to surge under certain pressure and flow conditions. If the gas flow at a given pressure through the machine falls to a certain level, stable flow over the blades breaks down and surging takes place. Its effect is greatly to increase the stress in the blades, and so for reasons of mechanical safety, the compressor must not at any time operate at, or near, this critical condition. As a safeguard against this surge condition developing, an automatically controlled bypass valve is incorporated in the pipework.

Gas is drawn from outlet of the gasholder through a 48-in. main running alongside the compressor house and thence to the compressors through 21-in. bore pipework. An orifice plate situated in the inlet main measures gas flow—this information is also used in connection with the

automatic bypass valve equipment. Before entering the compressor, gas passes through a screen containing a number of layers of very fine gauze, then through a cascade corner piece which serves to straighten the gas stream, so reducing turbulence at the gas entry annulus.

Gas delivered by the machine passes down a 16-in. main through an after-cooler and non-return valve to be discharged into the district main. The bypass arrangements situated on the outlet side of the after-cooler, ensure that only fully cooled gas is fed back to the inlet main, thus avoiding a progressive increase in operating temperature during recirculation.

An electrically driven fan, housed in an adjacent room, supplies air through trunking for air purging the main motor to comply with flame-proofing requirements; minor air supplies are also taken from this trunking for purging various instrument panels and control equipment situated on the operating floor.

## Conventional cooling system

Duplicate motorised pumps in a separate building, working in conjunction with a pond and cooling towers of conventional design supply cooling water. Waste water from the cooling system of a neighbouring booster house is piped into the pond, and provides the required quantities of make-up water; this avoids having to draw from the town supply. The cooling water mains are carried at high level in the basement, from which connections are taken to the main gas cooler, and auxiliary coolers for the hydraulic coupling and lubricating oil systems.

Condensate accumulating at the base of the after-coolers is conveyed to a suitable collecting point outside the main building. The early calculations of the quantities of condensate to be expected have proved to be reasonably accurate; in practice, however, the bulk of this condensate accumulates at the first syphon on the district main beyond the compressor house.

The functioning of Washwood Heath station has been based upon gas pressure control, by which gas at a constant pressure is supplied into the district main. To maintain a fixed discharge pressure, the machine speed is varied by a scoop controlled fluid coupling, working under the influence of a process controller. The process controller is an electronic device transmitting an electric current of varying power to an electro-magnetic head, and this in turn controls the scoop tube of the hydraulic coupling. Fig. 2 shows in diagrammatic form the arrangement of the electro-hydraulic positioner for speed control.

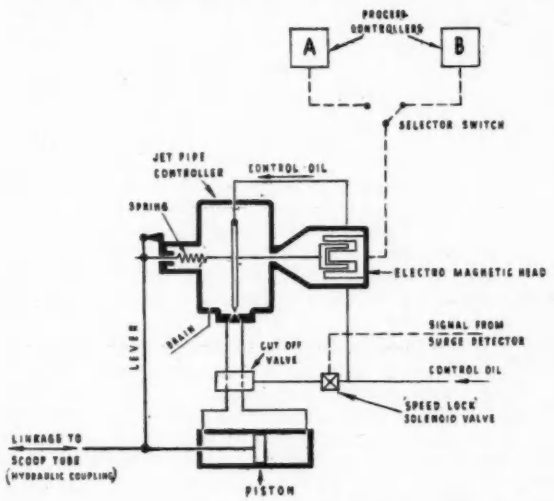



*Fig. 2. Electro-hydraulic positioner controlling hydraulic coupling.*

The controller works on the 'jet pipe' principle, by which a jet of oil issuing under pressure from a nozzle impinges on a surface at right angles to the direction of flow; a pressure is set up on this surface. There are two small orifices in the distributor plate situated opposite the nozzle and these are connected by pipes to either side of the operating piston controlling the scoop tube. The electro-magnetic head containing a moving coil suspended in the field of a powerful magnet is directly linked to the jet pipe.

Movement of the jet by the electro-magnetic head will, therefore, cause a change in position of the piston and scoop tube, and so an alteration in machine speed. The mechanical linkage and the spring between the piston and jet pipe serves to balance the force being applied by the magnetic head; this force varies with the position of the scoop tube. For instance, a signal of different strength transmitted to the head, will be converted into a force acting on the jet pipe; the jet position will change, causing the piston to move. When the piston has reached a position corresponding to the new signal, the force being applied by the spring will have balanced the force from the magnetic head. The jet pipe will then have been returned to its mid-position, equilibrium restored in the system, and the piston will remain stationary. Any given output signal from the process controller should, therefore, always locate the piston in a similar position, but not necessarily produce the same machine speed, for this will depend upon the power being transmitted through the hydraulic coupling.

The machine speed may be controlled manually; the oil supply to the jet can be isolated, and a bypassing circuit in the hydraulic system allows the scoop to be unlocked, adjusted to any desired position manually by means of a lever, and then relocked.

The Washwood Heath plant has been designed to operate with the minimum of attendance and to be controlled by one man per shaft, even when two machines would be running in parallel; the automatic control equipment has been installed with this in view.

## Precise control indicated

With the known load changes on the high pressure system in mind, together with the implications of running two independent compressing stations in parallel, a precise form of control system was indicated, which would react quickly to changes in demand and still possess good stability. The anticipated load changes on the system appeared to be of such speed and magnitude as to demand a three-term type of process controller rather than a single-term type, *i.e.*, simple proportional control. The main features of these two methods are:

*Single term.* The corrective action is proportional to the deviation of measured value from the desired value. The degree of correction applied can be varied by adjusting the width of the proportional band so that changes in load can be met with the minimum of over or under correction. There is, however, an inherent error in this type of control, known as 'offset,' which prevents complete recovery to the desired value after a load change has taken place.

*The Three-term* type of control incorporates proportional, derivative and integral components. The derivative action takes into account the speed of change and reduces the degree of overshoot, enabling a faster return to stable conditions. The integral action eliminates 'offset' error and permits full restoration to the desired level of pressure.

An electronic system, incorporating all the requirements for three-term control, was supplied by Evershed & Vignoles, Ltd.

Experience has shown, however, that in practice the proportional controller is quite satisfactory, since the 'offset' error can be compensated for by manual adjustment of the desired value setting. In the Evershed system the quantity to be controlled, *i.e.*, pressure in the main at point ot departure from the station, is translated into an electrical signal, which is compared with another signal corresponding to the desired value, and results in a final signal which represents the error in the system. This final signal is used to provide proportional control of the unit and can be modified to give two or three term control by electrical integrating and differentiating methods.

The process controller has the following main circuits.

1. The measuring circuit. Current flowing in this circuit has a range of 0 to 30 mA (d.c.) which corresponds to a pressure range of 5 to 30 p.s.i. The current flow in this circuit is interpreting gas pressure in the outlet main.

2. The desired value circuit. This circuit provides the reference current which remains stable at a selected value, and is determined by the pressure required in the ou et main.

3. The control circuit. The proportional control circ it establishes the error current, *i.e.*, the difference betwe en currents flowing in circuits 1. and 2. With three-te m control this current is applied to the integral and derivative circuits and results in a signal to the magnetic head w th proportional, integral and derivative content.

### Electronic controllers provided

The above equipment is housed in a central desk within the control room. Two electronic controllers are provided but only one is operating at a time, which allows routine checks and servicing to be undertaken without interference with the normal operation. Each controller has a hand/automatic selector switch which allows the speed to be remotely controlled by hand from the desk. An electrically operated gas pressure indicator located adjacent to the controllers employs the same signal as the measured value circuit.

An audible warning device operates when the measured value deviates beyond predetermined limits from the desired pressure.

## GAS IN FRANCE

# *Fine show of appliances at 'Ideal Home'*

THE *Salon des Arts Ménagers* may be taken, one supposes, as the Parisian equivalent of London's Ideal Home Exhibition. The *Allée du Gaz* was marked this February by a luxuriant tropical garden, arranged below floor level, and kept at the right temperature by gas. 'Tropical flora and exotic animals . . . acclimatised to the Grand Palais thanks to heat provided by gas.'

A fine show of gas appliances was staged. The Editor of the *Journal des Industries du Gaz* discusses it in his March issue. The water heaters, he says, are more compact and most of them are now equipped not only with the pressure regulators required by the new standard but also with temperature selection.

'None of them, unfortunately,' he says, 'are yet of the closed circuit type and one can only regret this when, in new dwellings, the English Se-Duct is appearing in which gas appliances can be branched with the twofold object of supplying necessary air and exhausting the products of combustion. Let us hope we shall see them next year, at the latest.'

The cookers, says the magazine, tend towards the replacement of enamelled iron grills by fine stainless steel bars, 'incontestably more elegant but which have not, perhaps, all the rigidity desirable. The burners are, more and more it seems, of the vertical injector type, which makes gas-tight hotplates easy to maintain.

'And a detail, which is not negligible from the point of view of safety, is that the taps are slightly asymmetrical so that one can see more easily whether they are open or shut. One is struck, on the other hand, by the fact that none of the hotplates or ovens are yet equipped with protection against accidental lighting failure.' The Editor thinks that France may be lagging behind in this respect.

In January gas output rose to 2,019.1 mill. thermies (81 mill. therms) against 1,860.5 (74.4 mill. therms) last year; an increase of 8.5%. Production showed an increase of 3.3%, coal used a reduction of 13.5%, liquid petroleum products a reduction of 13.1%, propane and butane an increase of 50%, but purchases of gas by Gaz de France reached a total of 1,059.6 mill. thermies (42.4 mill. therms), an increase of 25% over the figure of January, 1959. About a quarter of this was purchased from colliery coke ovens and a third was natural gas.

The Upper Lacq field produced 6,345 tonnes of crude petroleum in the month of February while the plant at Lacq treated 294 mill. cu.m. (10,382 mill. cu.ft.) of crude gas against 105 mill. cu.m. (3,708 mill. cu.ft.) in 1959. Progress in boring is reported there as well as in Aquitaine, the Rhone valley and the Sahara.

A new work by M. Antoine Bolzinger, Director-General of Production and Transmission, Gaz de France, is shortly to be published under the title 'Génie Chimique et Traitement du Gaz.' Two chapters are presented in the March Journal, Chap. VIII 'Exhausters & Compressors,' Chap. IX 'Elimination of Aerosols and Detarring.'

Chap. IX opens with the remark: 'At the outlet of the condensers the gas still contains tar in the forms of a fog of fine droplets, that is to say, in the condition of aerosols. Detarring therefore is a question of eliminating aerosols.' Several types of apparatus used are described and analysed, The Pelouze, the cyclone, the Livesey and the electrostatic detarrer. Mention is made of the use of sonic and ultra-sonic vibrations to conglomerate the particles as a preliminary to the detarrer. The aerosol venturi has also been used with success.

Apparatus in use at the Research Centre, Gennevilliers, is described by M. Robert Liard, Chief of the Test Department.

The term 'total carbon' is applied to the number of cu.m. of $CO_2$ produced by the complete combustion of one cu.m. of gas, in the formula $F = GC/c$, where F and G are the hourly flows in cu.m. of products of combustion and the gas under test respectively, c the proportion of $CO_2$ in the products of combustion and C the 'total carbon.' The gas is burned in excess air under a hood open at the bottom. Gas and products of combustion are brought to an equal temperature in a water bath and both are measured.

# East Midlands appliance sales shatter records, conference told

SALES of gas appliances in the East Midlands broke all records during the last financial year when the turnover increased by about 16% to reach almost £4 mill. Mr. R. S. Johnson, Chairman of the East Midlands Gas Board, announced this when he was addressing the Board's annual sales conference held in the Little Theatre, Leicester, last Friday.

Mr. Johnson told the sales staff 'This performance is an outstanding achievement. It has been obtained by a combination of good planning, good management and good selling'.

The most significant sales rise was in gas refrigerators, which jumped by about 75%. Space heater sales at 33,300 rose by 12,000, while water heater sales rose from 19,500 in 1958-59 to 24,000 this year. More than 70,700 cookers were sold during the year.

On the re-introduction of the Hire Purchase and Credit Sale Control Order, Mr. Johnson said that new circumstances called for a new approach, and although it was difficult to assess in so short a space of time what the effect of the new hire purchase controls would be, every possible effort would be made to make the purchase of gas appliances attractive to the Board's customers.

Guest speakers at the conference were Mr. Stuart Thomson, Editor of *Selling*, and Mr. A. H. Franklin, a Director of Gee Advertising Ltd.

*Mr. J. Bateman, Car House works, Rotherham (right) receives a cup from Mr. E. C. Williams, President, Yorkshire Junior Gas Association. The cup was awarded to two Car House technicians, Mr. R. Fleming and Mr. P. G. Harris, for their joint paper, 'The Desulphurisation of Town Gas by Oil Washing'.*

# I.G.U. COUNCIL MEETS IN PRAGUE

THE Council of the International Gas Union met in Prague on April 4 and 5 under the chairmanship of Mr. B. M. Nilsson, President of the Union, with Mr. R. H. Touwaide, the General Secretary, in attendance. Delegates of the national gas associations of Belgium, Czechoslovakia, Denmark, German Federal Republic, France, Great Britain, Italy, Netherlands, Rumanian People's Republic, Sweden and the U.S.S.R. were present.

Prof. Dr. Ing. R. Riedl, President of the Czech Gas Association welcomed the members of the council and expressed his pleasure at receiving them in the Czechoslovakian capital. On behalf of the delegates attending the meeting, Mr. B. M. Nilsson warmly thanked Dr. Riedl for his kind welcome and for his friendly hospitality.

Progress reports of the work of the six international committees of the union formed the subject of careful examination. The council noted with particular satisfaction the statement made by the Chairman of the Vocabulary Committee that its work would be published before the end of the year.

The council approved a note drawn up by the Secretariat, at the request of the Gas Committee of the O.E.E.C., as the outcome of consultations between experts on the production of rich gas interchangeable with natural gas.

A report on the study of safety conditions in domestic, commercial and industrial gas installations, at the request of the Working Party on Gas Problems of the Economic Commission for Europe, was also approved.

Other questions submitted to the union by the E.C.E. Working Party on Gas Problems were discussed and the council made the necessary arrangements to supply the information required.

The members of the council were introduced to Mr. J. Farka, Vice-Minister of Fuel, at a luncheon over which he presided.

## NEWS SUPPLEMENT

## *PARSONS AND P.G. IN CONSTRUCTION ENTERPRISE*

FORMATION of Parsons Powergas, with headquarters in London, has been announced as a joint enterprise by the Ralph M. Parsons Company, engineers—constructors of Los Angeles and P.G. Engineering Ltd., a member of the Power-Gas Group, an organisation of British companies founded in 1901.

Complete engineering and construction of petroleum, petrochemical and related plants will be performed by Parsons Powergas, backed by the combined resources and experience of the parent companies.

**Committee names**

Initially, activities will be concentrated in the British Commonwealth. The two firms will each appoint three men to a committee which will direct the new enterprise. Parsons has named Vice-Presidents Harry Broom and Robert V. Peaslee and Ahmet Neyzi, European Operations Manager, to the committee. Mr. R. W. Rutherford, Managing Director of P.G. Engineering Ltd., has been appointed to the committee and names of the other two members will be announced in the near future. Mr. Peaslee will serve as General Manager of Parsons Powergas.

Facilities of the world-wide chain of offices maintained by Parsons and P.G. Engineering are available to the new organisation.

## *GAS TEACHERS PLAN NEW ASSOCIATION*

TEACHERS of gas subjects in the Nottingham area are considering the formation of an association of full and part-time teachers and of those within the gas industry interested in education.

The teachers are planning to hold a meeting during the summer vacation somewhere in the Midlands in order to discuss the idea.

All who are interested in the proposal are invited to write to Mr. L. V. Dover, People's College of Further Education, Castle Road, Nottingham.

Radiation Ltd. are recommending to stockholders a dividend of 10%, plus a bonus of 2%, for the year ended December, 1959. Profits before tax amounted to £2,822,624 compared with £1,020,912 in 1958. Balance is £951,736 compared with £737,795 in 1958.

# Labourers can become skilled under Eastern Board scheme

UNDER a classification scheme run by the Eastern Gas Board labourers in the industry can train to become either special servicelayers or gangers (mains). The scheme was negotiated through the Eastern Area Joint Industrial Gas Council and sets out the method of progression and the duties of each category, step by step.

The aim of the scheme is to produce a force of well-trained mains and servicelaying personnel. This should result in economy though the standardisation of mains and servicelaying methods, together with an increase in general efficiency and safety.

### Long-term policy

The Board's long-term training policy is planned to cover every mains and servicelaying worker. When the scheme began, established mains and servicelayers were given the chance of qualifying. Later, a comprehensive training scheme was adopted.

Under this, all main and servicelayers' mates with more than 12 months' service can attend a one-week course of practical instruction in marking out trenches, excavating, timbering and back filling, emphasis being placed on safety precautions and first aid. After the course the men can seek promotion and if there are prospects of a vacancy, they then undergo a further fortnight's training.

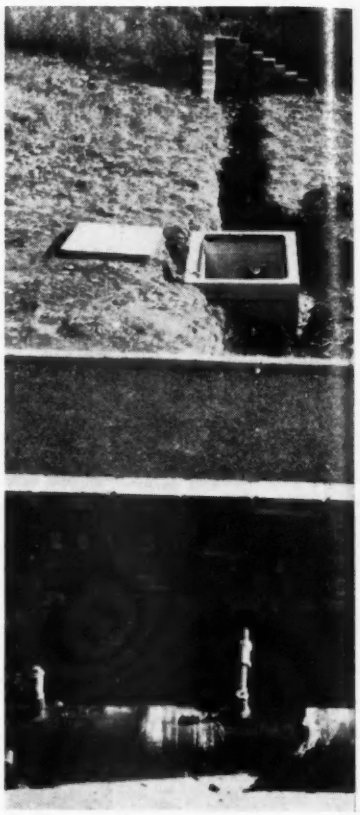
These courses have a bias towards either mains or servicelaying. But employees in small and isolated districts, where both jobs may have to be done by the same gang, receive the benefit of a combined course.

Examinations for both positions are held annually in conjunction with the Board's classification scheme and certificates similar to those for gas fitters are awarded under the jurisdiction of the Eastern Area Joint Industrial Gas Council.

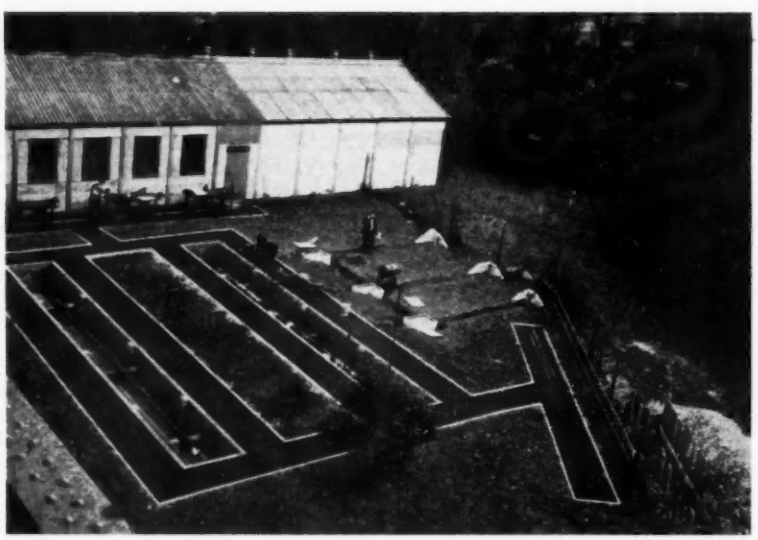
The principal objective in the courses is to provide suitable facilities for practical work. The Board's training centre at North Watford is situated on a suitable piece of ground next to a large gas holder station. There are facilities for supplies not only of low-pressure gas but also for gas at pressures up to 10 p.s.i. In addition there is enough ground covered with course grass and scrub to enable full-scale training to be given in the marking out and excavation of trenches, timbering and back filling.

### Standard examination

Consideration has been given to the necessity of preparing a standard form of practical examination suitable for this type of employee, which could be arranged and worked on similar lines to the City and Guilds examinations in gas fitting.



*The finished job—a high pressure service using Johnson Junior couplings and connecting through a high pressure governor pit to consumer's control on the brick wall at rear. This complete installation was carried out by each candidate.*



*General view of training ground showing two specially constructed brick trenches which facilitate practical training in drilling cast iron and steel mains at either high or low pressure. On the extreme right can be seen a trench used for practice in excavating, timbering and back filling.*

## COMPANY'S REPORT MENTIONS BOYCOTT

REFERENCE was made to the boycott of South African goods by the Chairman of the Cape Town and District Gas Light & Coke Co. Ltd., at the company's 70th A.G.M. in London recently.

Mentioning the fact that over 80% of the company's employees were non-Europeans, Mr. G. L. Barstow said, 'In past years there has been no suggestion that they were not well content with conditions of employment and many have been with us for long periods. Their relations with the management have always been harmonious, with, I believe, mutual respect. A boycott might well injure our workers, our stockholders and British contractors for goods we purchase, as much or more than those against whom it is directed.'

Net profit for the year amounted to £30,381. A 10% dividend on ordinary stock was recommended.

# Scottish Board may penalise the last-moment payers

THE Scottish Gas Board have agreed that the area commercial policy committee should consider and report on the value of imposing a charge on those consumers who either refuse or delay to pay their bills and are issued with a final notice.

This was reported at a meeting of the Scottish Gas Consultative Council in Edinburgh recently, when it was stated that it was costing roughly £5,000 a year to send out final notices in the West of Scotland.

At a previous meeting of the Council it was stated that it had been estimated that it was costing the Board at least 6d. to issue each final notice, and that consumers who paid regularly were being penalised.

Sir Robert Nimmo, Perth, Chairman of the Council, stated that the Scottish Housewives' Association had requested that a deputation should be received.

### DEPUTATION

It was agreed that a deputation could be received by the Chairman of the Consultative Council, the Deputy Chairman and the chairmen of the district committees on July 27.

*Youngest member of the Scottish Gas Board staff, 15-year-old typist Evelyn Cooke, presents a silver entree dish to the retiring Deputy Chairman, Mr. D. D. Burns,* O.B.E. *The Board's Chairman, Mr. Sydney Smith,* C.B.E., *looks on.*

## 14 COUNTRIES AT DISTILLATION SYMPOSIUM

SIX hundred leading chemical engineers from 14 countries including Russia and America heard Sir Alexander Fleck, K.B.E., deliver the opening address at the International Symposium on Distillation held at the Dome, Brighton, from May 4-6.

Sir Alexander gave a brief historical review of distillation from the early days, thus leading up to the subject matter of the symposium dealing with the present trends and techniques.

The delegates then discussed 28 papers from authors in ten countries. Among those taking a leading part in the symposium were the 'Doyens of Distillation,' Professor Dr. E. Kirschbaum (W. Germany) and Dr. A. J. V. Underwood (U.K.). Other prominent engineers from overseas included Professor Edmister (U.S.A.), Professor Vermeulen (Germany), Professor Heertjes (Holland) and Professor Warren K. Lewis (U.S.A.).

The President of the Institution of Chemical Engineers, Mr. W. K. Hutchison, C.B.E., who is Deputy Chairman of the Gas Council, presided at the opening ceremony and also at the last technical session.

The symposium was arranged as the 24th meeting of the European Federation of Chemical Engineering. It represents an experiment in the organisation of international technical meetings which may set a pattern for future events.

## *SCHOLARSHIP OFFER*

CONSTRUCTORS John Brown Ltd. have entered into an agreement with the Institution of Chemical Engineers for the award of two scholarships. The purpose of the scholarships is to encourage research in chemical engineering and, in particular, in chemical plant design.

The scholarships are tenable at any educational institution in the United Kingdom in receipt of grants from the University Grants Committee, and having a department of chemical engineering under the direction of a professor of chemical engineering.

## *West of Scotland works close*

TWO further gasworks in the West of Scotland have closed down namely, Lesmahagow and Skelmorlie.

Both of these works date back to the middle of last century and now having served their useful purpose have made way for the new West of Scotland gas grid which is coming into being.

The consumers in these areas will benefit from the gas supply provided by the grid which takes gas from many sources, ensuring continuous, even supply at the Scottish standard tariff rates.

## S.W.G.B. runs 'new look' campaign

THE South Western Gas Board has started a 'new look' in advertising. Using contemporary, stylish techniques, the Board's campaigns are now on a far larger and more comprehensive scale than ever before.

A two-page feature in most daily and weekly papers in the area last November was the commencement of the 'new look' campaign, the opportunity being taken to offer attractive discounts on a wide variety of appliances. There was a record sale of cookers and water heaters during the period and this was exceeded during the national cooker campaign.

An all-out campaign to sell gas-fired central heating was launched in March and will be given a new impetus in early Autumn. The advertising has a definite point to make, the main themes being: Cheapest central heating system to install; completely automatic and trouble-free; and (on the domestic two-part tariff) comparable in operating costs with any other fully-automatic system.

Additional publicity includes a number of colourful booklets and there is direct mail advertising to 7,000 architects, builders, heating and ventilating engineers in the South West.

## PERSONAL NOTES

MR. A. A. BISHOP, Sales Director of Morley Products Ltd. (a Glover & Main Company) has accepted the position of Sales and Distribution Manager to the Wellington Gas Company, New Zealand. He will be leaving early in July and would be interested to receive from manufacturers details of any plant equipment or appliances they wish to bring to the attention of the Wellington Gas Company. Communications should be addressed to 27, Malcolm Road, Wimbledon, London, S.W.19. Mr. Bishop has asked us to express regrets that time may not permit him to personally to say goodbye to all his friends in the industry.

MR. G. F. JENKINS, at present Sales Director of Main Water Heaters Ltd. will assume similar responsibilities for Morley Products from July 1 pending amalgamation of both companies later in the year, and for the time being the Kensington office of Morley Products will continue to function under Mr. Jenkins' control. MR. B. P. REAMES and MR. N. L. KIRKUP, at present representatives of Thomas Glover & Co. Ltd. have transferred to Main Water Heaters Ltd. and will represent both this company and Morley Products Ltd. When the two companies amalgamate, their representation will undergo certain reorganisation.

## COMING EVENTS

**May 20.** — LONDON AND SOUTHERN JUNIORS: Westminster Technical College, Vincent Square, S.W.1. Annual business meeting. 6.30 p.m.

**May 21.**—EASTERN JUNIORS: Clacton-on-sea. Annual general meeting.

**May 21.**—NORTHERN JUNIORS: Middlesbrough. 'Feed Water Treatment,' by G. Taylor.

**May 21.**—WESTERN JUNIORS: Demonstration Theatre, Radiant House, Plymouth. Special general meeting followed by paper on 'The City Centre of Plymouth Reconstruction,' by P. D. J. Davies. 2.15 p.m.

**May 23.**—WEST MIDLANDS G.C.C.: Conference Room, Gas Offices, Edmund Street, Birmingham 3. 2.30 p.m.

**May 24.** — SOCIETY OF INSTRUMENT TECHNOLOGY: Manson House, 26, Portland Place, London, W.1. Annual general meeting and presidential address. 6 p.m.

**Left : Mr. J. Scott**

**Right : Mr. R. S. A. Rix**

MR. J. SCOTT joined the sales staff of Parkinson Cowan Industrial Products as Technical Representative on April 1, 1960, and will operate in the West and East Midlands Gas Board areas (less the Sheffield and Rotherham Division) jointly with Mr. R. S. A. Rix, covering Parkinson-Schwank radiant space heaters, gas conveyorised ovens, rotary meters, laboratory gas test meters and spirometers. Mr. Scott has a wide experience in thermal and mechanical engineering, particularly in these fields, and is well-known to gas engineers throughout these areas.

MR. R. S. A. RIX, of Parkinson Cowan Industrial Products, has covered the West and East Midlands Gas Board Areas (less the Sheffield and Rotherham Division) as Technical Representative for the past two years, and has over 20 years' experience in heating and drying. He will act as senior to Mr. J. Scott, who has recently joined the Company, and together they will give increased service and greater coverage

## OBITUARY

### SIR JOHN STEPHENSON

Sir John Walker Stephenson, C.B.E., died at Manor House Hospital on Sunday.

*Mr. John H. Dyde, Chairman of the Eastern Gas Board, writes:—*

I had not met him before 1949, when he was appointed the first chairman of the Eastern Gas Board, and can therefore write with first hand knowledge only of the last ten years of his diverse and outstanding career.

He came to the gas industry as an expert in labour relations and trade union matters, having already achieved considerably more than most men in a lifetime, and, as his deputy for a decade, I would like to bear witness to the manner in which he crowned his achievements in what has proved to be his final task. Sir John began as an apprentice plumber, worked as a journeyman with his tools, and eventually became general secretary of the Plumbers' Trade Union. He was the first operative plumber to become, in 1957, Master of the Worshipful Company of Plumbers.

His reputations as an administrator extended far beyond the trade union movement and on the outbreak of the last war, he was asked to serve in the Ministry of Aircraft Production under Lord Beaverbrook and at the Board of Trade with Sir Stafford Cripps. At the end of the war he became Adviser to the Ministry of Aircraft Production and, in recognition of his war services, was appointed C.B.E. in 1944. He was knighted in 1948.

It was no easy task to take up the initial chairmanship of a new nationalised organisation, particularly as he then assumed for the first time the mantle of an employer. He brought to this task, however, the same breadth of mind and administrative vision that had distinguished all his previous roles. While quickly and successfully tackling the task of understanding the ramifications of the gas industry he was wise enough to leave the detailed technical and commercial problems to his experts and to concentrate on the basic requirement of welding a hundred different undertakings, all with different loyalties, into one team. In achieving this he left unimpaired a man's personal dignity—from his colleagues at board level to the humblest apprentice in the rank and file. In this lay the secret of his inspired leadership and of the loyal service and affection that he commanded. While always true to his basic Socialist principles he never allowed his political tenets to influence him outside the narrow field of politics.

The charm of his relaxed personality was his outstanding characteristic and made for him a wide circle of friends in all walks of life. He had a quiet but kindly sense of humour and, with his warmhearted understanding of human frailties, was ever ready to help the many friends and acquaintances who sought his aid. He was a man of simple tastes yet catholic interests. He was widely read. He loved sport, especially cricket and soccer.

I count myself fortunate indeed to have served under him, to have had the great privilege of his guidance and counsel and, above all, the inestimable benefit of learning a little from the vast sum of this man's human experience. All who met him were at once his friends and I am but one of a countless number who mourn him.

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MR. A. G. BIRD, London Director of West's Group of Industries and Managing Director of West's Piling & Construction Co. Ltd., has died aged 69.